Floden, A. 2011. Frugivory in *Dirca* (Thymelaeaceae) as a method of short-distance dispersal. Phytoneuron 2011-8: 1–3.

FRUGIVORY IN *DIRCA* (THYMELAEACEAE) AS A METHOD OF SHORT-DISTANCE DISPERSAL

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ABSTRACT

Dispersal in *Dirca* remains relatively understudied, with only minimal data on hydrochory and no data supporting a hypothesis of bird dispersal. Observations are presented that suggest frugivory, as evidenced by rodent seed caches, as a mechanism for short-distance dispersal in *Dirca*.
KEYWORDS: *Dirca*, rodent, frugivory, endochory, dispersal

Given the close association of *Dirca* L. species with riparian systems, it has been assumed that a major mechanism for their dispersal is hydrochory (Nevling 1962; Ward & Horn 1998; Williams and Moriarity 1998; Floden 2009; Williams 2009). Recently, hydrochory was tested as a method of seed distribution for *D. palustris* L. and it was determined that the buoyancy time for the species does not support hydrochory as the predominant method for dispersal (Williams 2009). Seemingly in contrast to this observation, the distribution of *D. palustris* in the southernmost part of its range is largely confined to riparian systems (Floden et al. 2009; Schrader & Graves 2004; Ward & Horn 1998).

Phylogeographic analyses of *Dirca palustris* might support hydrochory as the primary mode of long-distance dispersal, based on the genetic structure of the populations. Gravity as a method for dispersal, however, is indicated by the number of randomly scattered seedlings under individuals in cultivation and in situ. Nevling (1962) suggested bird distribution as a mechanism for dispersal, but the fruits do not ripen red to signal maturity, nor is there any evidence yet that supports this (Floden et al. 2009).

Frugivory has been suggested as a likely short-distance dispersal mechanism, as evidenced by multiple seedlings growing from a relatively small area, which suggests rodent caches of seed (Ward & Horn 1998) but direct evidence in support of this hypothesis has been lacking. Observations of shrubs at the type locality for *Dirca decipiens* Floden during fruit maturation suggest rodent endochory, as the majority of fruits from a shrub are promptly removed nocturnally when the first drupes mature. Maturity of the fruit is signaled by a slight shift in color from green to pale yellow on the apices sequentially from the top down; light pressure will cause mature fruit to drop (Ward & Horn 1998; Schrader & Graves 2005; Graves 2008; Floden et al. 2009). Evidence of seed predation was observed as pericarp remnants beneath the shrubs, but no uneaten seeds were observed.

Observations in 2010 by the author of a population of *Dirca decipiens*, near its type locality but established in the garden of my parents, found evidence of multiple rodent seed caches under rocks and under heavy leaf litter (Figs. 1 and 2). Each cache consisted of many uneaten seeds but an even larger quantity of pericarp remnants. Additionally, uneaten seeds of previous year's seed caches were evident, with multiple seedlings germinating in large numbers (5–15) from individual locations, which would preclude the natural ripening and abscission of fruits from the shrubs. This supports the suggestion by Ward and Horn (1998) that frugivory is a possible method of seed dispersal.

In the western *Dirca occidentalis* A. Gray, little evidence of frugivory was noted and none of that definitive (Schrader & Graves 2008). Evidence of the effectiveness of frugivory vs. seed predation as shown by seed caches should be explored further in each species to determine the extent short-distance dispersal plays in distribution, while molecular analysis may clarify the role of hydrochory as a method of long-distance dispersal.

ACKNOWLEDGEMENTS

I thank Dr. B.E. Wofford and Dr. Guy Nesom for their reviews and suggestions on the manuscript.

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Figure 1. Portion of cache of *Dirca decipiens* seeds, showing possible effects of frugivory. Whole fruits ca. 1 cm long.

Figure 2. Cache of *Dirca decipiens* seeds.